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(54) Electric incandescent lamp.

(57) The electric incandescent lamp has a lamp vessel (1) with an axis (2) and a reflective coating (3). In the larp vessel, two filaments (4, 5) are arranged in a disk-shaped space (16) transverse to the axis (2). They are electrically connected in series in that the second end portion (7) of the one filament (4) is electrically connected to the first end portion (8) of the other filament (5). They are arranged opposite each other around the axis (2) of the lamp vessel (1) so that the like end portions (6, 8 and 7,9) are located closest to each other. The like end portions can be located at a relative distance both in axial and in transverse direction. The lamp produces a symmetrical light beam of high intensity at the centre thereof.

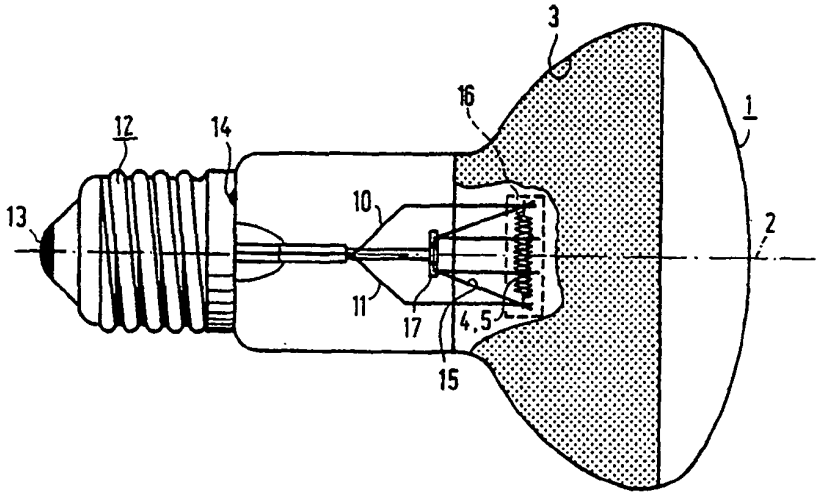

FIG.1

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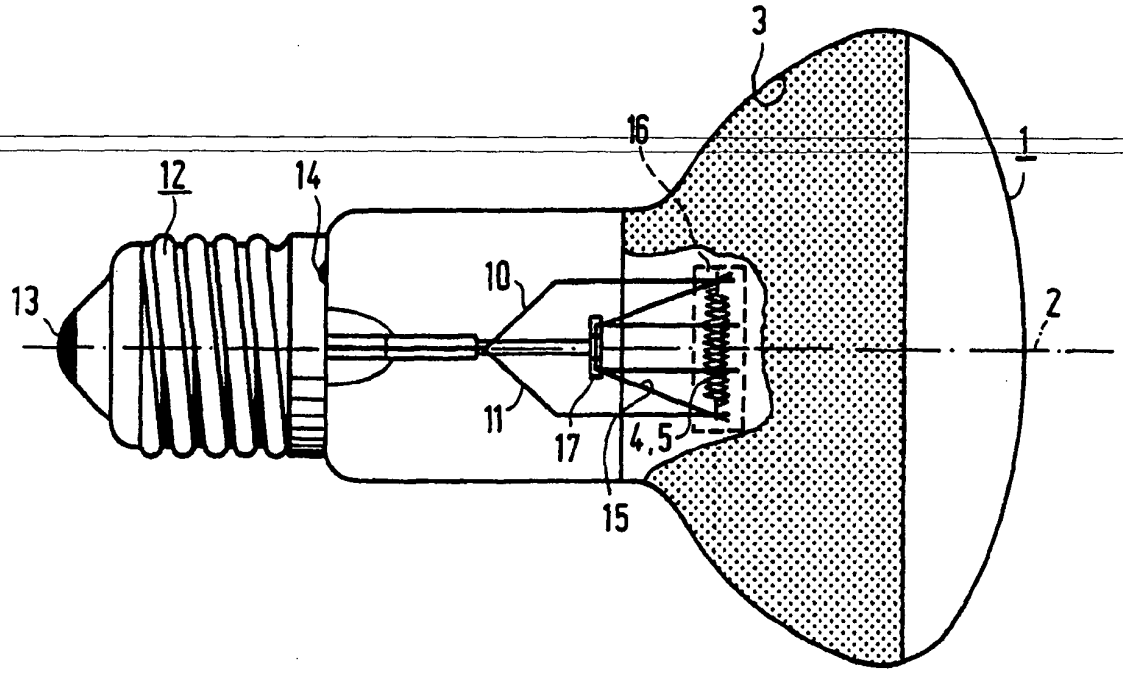

FIG. 1

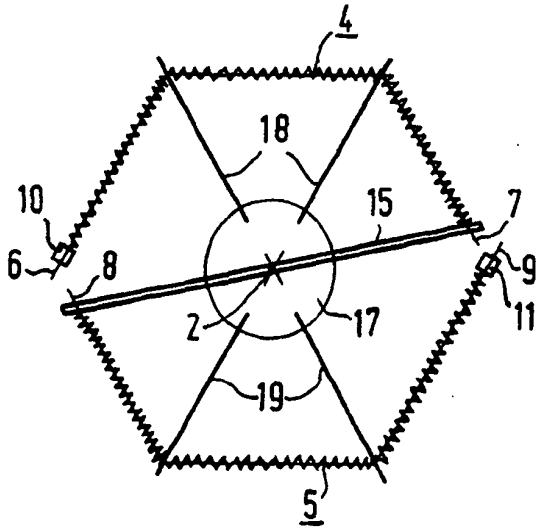

FIG. 2

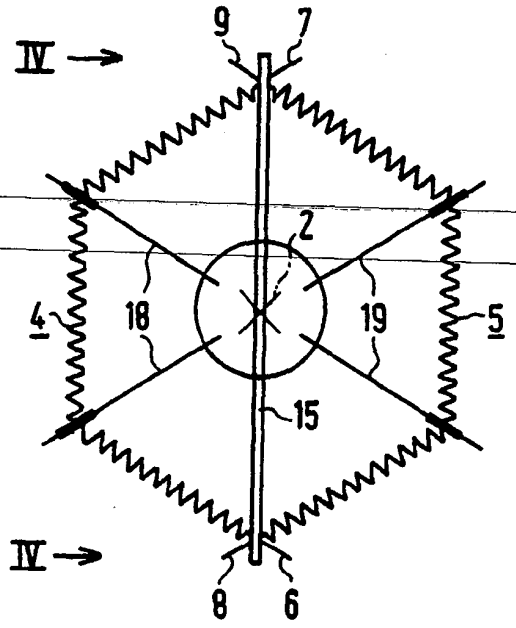

FIG. 3

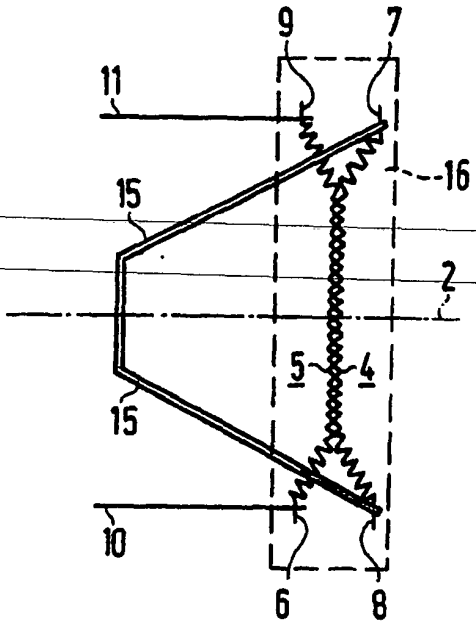

FIG. 4

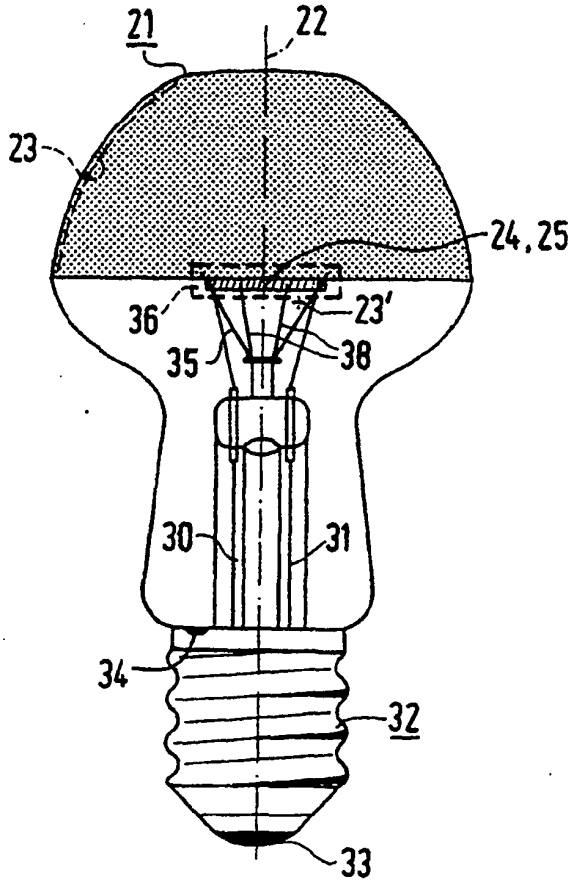

FIG. 5

ELECTRIC INCANDESCENT LAMP.

The invention relates to an electric incandescent lamp to be operated at mains voltage comprising

- a translucent lamp vessel with an axis provided with a reflective coating,
- a first and a second wound filament having respective first and second end portions arranged, in the lamp vessel near the axis thereof,
- current supply conductors connected to a respective end portion of the first and the second filament emanating from the lamp vessel.

Such a lamp is known from NL 121 505.

In the known lamp, the filaments are linearly arranged at an angle of 45° to the axis and at right angles or parallel to each other.

This shape and this arrangement result in that portions of the filaments are located at a great distance from the axis of the lamp vessel. This has the consequence that the light beam formed due to the reflective coating of the lamp vessel has a large width and consequently a low luminous intensity at the centre thereof. Another consequence is that the light beam is inhomogeneous and not rotation-symmetrical. The filaments may have different powers; for example, one filament may have a power twice that of the other.

Various other incandescent lamps having several parallel-connected filaments are known. For example, EP 0 280 475-A discloses a lamp having two transversely arranged filaments forming a closed figure. One of these filaments is designed for a longer life than the other. This has for its object that the lamp continues to emit light for a long time when a first filament has already burnt through.

Such a lamp is not efficient because the longer life of the filament having the longest life is inevitably connected with a lower light output per unit of energy consumed. The nett light output of the filament having the longest life is still lower than the gross light output thereof because by evaporation of the material of the filament having the shortest life, after it has burnt through, a light-absorbing deposit of evaporated filament material has formed on the lamp vessel.

A similar lamp is known from GB 426 477.

The aforementioned EP 0 280 475-A also discloses a lamp having three filaments. Two of these filaments are connected parallel to each other. They are connected together in series with the third filament. These filaments are designed to have different lives: one of the parallel-connected filaments has the shortest life, while the filament connected in series therewith has the longest life.

In incandescent lamps having a reflective coating, the filament is mostly arranged transversely so as to be bent around the axis of the filament. Such an incandescent lamp is known from US 4,777,300. Due to the comparatively great length an incandescent body for operation at mains voltage has, this filament extends, also when it is arranged so as to be bent around the axis, at a comparatively great distance from the axis. A comparatively large width of the light beam formed is the result. Other consequences of the position and the shape of the filament are the formation of a non-symmetrical light beam and a comparatively low luminous intensity at the centre thereof.

The invention has inter alia for its object to provide a lamp of the kind described in the opening paragraph, which has a more symmetrical light beam having a high luminous intensity at the centre of the beam.

According to the invention, this object is achieved in that the first and the second filament are electrically connected in series in that the second end portion of the first filament is electrically connected to the first end portion of the second filament and the first and the second filament are arranged opposite each other around the axis of the lamp vessel substantially in a disk-shaped space transverse to said axis so that their like end portions are located closest to each other.

Due to the arrangement of the filaments, light is generated around the axis of the lamp vessel and a beam of high symmetry is obtained. This is the case although the like end portions of the filaments are at a mutual distance of several mms in order to prevent electrical flash-over. Not the full mains voltage, but only a part, for example half this voltage, is applied between these like end portions so that the risk of flash-over is reduced. By the use of a filling gas at a comparatively high pressure, especially with the use of a filling gas having a high ionization energy, such as, for example, nitrogen, the risk of flash-over can still further be reduced. Due to the fact that in the lamp according to the invention there is not used only one filament, which would provide, when arranged around the axis, a comparatively large gap between the end portions of said filament, in the lamp according to the invention this gap is divided around the axis of the lamp vessel.

In a favourable embodiment, the filaments are arranged so that the gap extends entirely or in part in axial direction. The like end portions of the filaments are then located at a certain mutual distance in axial direction. The disk-shaped space in which the filaments are arranged then has a larger dimension in the axial direction of the lamp vessel

than when the filaments extend entirely parallel to a transverse plane.

In a conventional lamp, the filament mostly has the form of a trapezium open at its base, whereas in the lamp according to the invention the filaments entirely or substantially entirely surround the axis. The light source of the lamp according to the invention is thus much more compact than in a conventional lamp. The greatest distance and the average distance of the filament from the axis of the lamp vessel are smaller than in the conventional lamp. The compact light source, close to the axis of the lamp vessel, produces with the reflecting lamp vessel a narrow light beam having a high luminous intensity and a very high luminous intensity at the centre. The luminous intensity of the beam is more than about 50% higher than in a conventional lamp.

It is favourable for the quality of the lamp when the first and the second filament are similar and have the same specification, such as, length, wire thickness and pitch.

Embodiments of the incandescent lamp according to the invention are shown in the drawing. In the drawing:

Fig. 1 is a side elevation of a first embodiment with a lamp vessel partly broken away,

Fig. 2 shows the filaments of Fig. 1, viewed along the axis,

Fig. 3 shows a variation of Fig. 2,

Fig. 4 shows the filament of Fig. 3, viewed along IV in Fig. 3,

Fig. 5 is a side elevation of another embodiment of the lamp.

In Fig. 1, the electric incandescent lamp to be operated at mains voltage has a translucent lamp vessel 1 with an axis 2. The lamp vessel is provided with a reflective coating 3, for example an aluminium layer applied by vapour deposition.

A first and a second wound filament 4, 5 (see also Fig. 2) having a respective first end portion 6,8 and a respective second end portion 7, 9 are arranged in the lamp vessel 1 near the axis 2 thereof. Current supply conductors 10, 11, which are connected to a respective end portion 6, 9 of the first and the second filament 4 and 5, respectively, emanate from the lamp vessel. The lamp shown has an Edison lamp cap 12 provided with contacts 13 and 14, to which a respective current supply conductor 10, 11 is connected.

In the embodiment shown, the mirror-coated part 3 of the lamp vessel 1 is parabolic, but this part could have been shaped differently, for example, in the form of an ellipse, or by rotating a curve, for example a branch of a parabola or an arc of a circle, about the axis 2.

The first and the second filament 4 and 5, respectively, are electrically connected in series (see also Fig. 2) in that the second end portion 7 of the first filament 4 is electrically connected to the first end portion 8 of the second filament 5, i.e. by means of a conductor 15. The first and the second filament are arranged opposite to each other around the axis 2 of the lamp vessel 1 in a disk-shaped space 16 transverse to said axis 2, in which in the embodiment shown the focus of the paraboloid is also located, in such a manner that the like parts of these filaments, i.e. the first end portions 6, 8 and the second end portions 7, 9 are located closest to each other.

In the embodiment shown, the filaments have the same efficiency. They also have the same resistance, as a result of which the voltage across each of the two filaments is half the mains voltage. The minimum distance between the first end portions 6, 8 can thus be equally large as that between the second end portions 7, 9. The gap between the filaments extends in transverse direction so as to be divided into two parts around the axis 2. In an insulator body 17, the conductor 15 and supporting members 18, 19 are anchored.

In Figures 3 and 4, the filaments 4 and 5 have, viewed in the direction of the axis 2, substantially the same geometry as in Figs. 1 and 2. However, it appears that in the side elevation of Fig. 4 the geometry deviates from that of Fig. 1. In Fig. 1, the gap between the filaments 4 and 5 extends between the first end portions 6, 8 and between the second end portions 7, 9 transverse to the axis 2 so as to be subdivided into two parts. It appears from Fig. 4 that in the arrangement of Figs. 3 and 4 this gap extends in axial direction. As a result, the filaments 4, 5 form, viewed in axial direction, that is to say in the direction in which the lamp emits the generated light beam, a closed figure and they together have a symmetrical configuration. The disk-shaped space 16 in which the filaments are located has in Figs. 3 and 4 a larger axial dimension, although the latter is minimized to a value which is sufficient to prevent electrical flashover. Combined forms of a transverse and an axial gap are also possible.

In Fig. 5, parts corresponding to parts of Fig. 1 have a reference numeral which is 20 higher. The filaments 24, 25 have the same configuration as in Figs. 1 and 2; they coincide with the largest diameter transverse to the axis 22 of the lamp vessel 21.

The lamp shown is a bowl mirror lamp intended to be used in an outer parabolic reflector. The lamp vessel 21 for this purpose has a reflective coating 23 on the surface remote from the lamp cap 32, which is curved according to the arc of a circle whose centr of curvatur 23' is located on the other side of the axis 22 and of the plane with the largest diameter in which lie the filaments

24, 25.

Claims

1. An electric incandescent lamp to be operated at mains voltage comprising
- a translucent lamp vessel with an axis provided with a reflective coating,
- a first and a second wound filament having respective first and second end portions arranged in the lamp vessel near the axis thereof,
- current supply conductors connected to a respective end portion of the first and the second filament emanating from the lamp vessel,

characterized in that
the first and the second filament are electrically connected in series in that the second end portion of the first filament is electrically connected to the first end portion of the second filament and the first and the second filament are arranged opposite each other around the axis of the lamp vessel substantially in a disk-shaped space transverse to said axis so that their like end portions are located closest to each other.

2. An electric incandescent lamp as claimed in Claim 1, characterized in that the like end portions of the filaments are mutually separated in axial direction.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2353

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,A	FR-A-6 763 37 (N.V. PHILIPS' GLOEILAMPEN-FABRIEKEN) * page 2, lines 90 - 99; figures 3, 6 * * page 3, lines 5 - 24 *	1,2	H 01 K 1/18 H 01 K 9/00
Y,D,Y	FR-A-1 258 680 (PATENT-TREUHAND-GESELLSCHAFT FÜR ELEKTRISCHE GLÜHLAMPEN) * page 4, right-hand column, last paragraph page 5, left-hand column, line 3; figure 4 & NL-C-121505 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 01 K

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	28 December 90	SCHAUB G.G.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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A: technological background
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